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ABSTRACT

Conventional wisdom holds that many children experience difficulty when they first read expository material after spending most of their reading time with simple narratives. Unfortunately, there is little available data bearing on this belief, nor is it clear how one would go about testing the claim. The labels "narrative" and "exposition" in fact reflect conglomerates of characteristics that affect text processing. However, these characteristics are not found exclusively in one type of text or the other--a narrative can possess many of the characteristics of exposition and vice versa. If children do tend to have greater difficulty with expository text, it is because expository text tends to have certain traits that produce heightened psychological processing difficulty. Perhaps the traditional text-type classification should be abandoned in the study of reading difficulty. Instead, texts should be classified as a function of the characteristics they possess that influence processing. A multidimensional psychological classification scheme of texts could be used to identify children's text processing problems, to investigate the cause of those problems, and to bring about the appropriate instructional changes. (Author/FL)

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CENTER FOR THE STUDY OF READING

Technical Report No. 195

ON INVESTIGATING CHILDREN'S TRANSITION FROM NARRATIVE TO EXPOSITORY DISCOURSE: THE MULTIDIMENSIONAL NATURE OF PSYCHOLOGICAL TEXT CLASSIFICATION

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Abstract

Conventional wisdom holds that many children experience difficulty when they are first asked to read expository material after spending most of their previous reading time with elementary narratives. Unfortunately, there is little available data bearing on this common belief. Furthermore, it is not clear how one would go about testing the claim. The labels "narrative" and "exposition" really reflect actuarially prevalent conglomerates of characteristics that affect text processing. However, these characteristics are not found exclusively in one type of text or the other; a narrative can possess many of the typical characteristics of exposition and vice versa. If children do tend to have greater difficulty with expository text, it is because expository text tends to have certain characteristics that produce heightened psychological processing difficulty. Accordingly, an argument is presented for abandoning traditional text-type classifications when they are used as undecomposed variables in the study of reading difficulty. Instead, individual texts should be classified as a function of the characteristics they possess that influence processing. A schematic outline of an approach to the multidimensional psychological classification of texts is presented. Finally, issues in the application of the classification scheme to identifying children's text processing problems, investigating the cause of those problems, and effecting appropriate instructional change are discussed.

On Investigating Children's Transition from Narrative to Expository Discourse: The Multidimensional Nature of Psychological Text Classification

In recent years, considerable research attention has been directed to the psychology of prose processing (see Goetz & Armbruster, in press; Reder, 1978; Spiro, 1980, for reviews). However, most of this work, especially that investigating children's performance, has focused on the comprehension and recall of narrative (Baker & Stein, 1978). Our resulting lack of knowledge about the way children process expository material (e.g., content area texts) is particularly unfortunate given that reading such material becomes so increasingly prominent a part of school experience after the third grade or so. Although we have been able to locate only a few preliminary empirical studies comparing children's performance on narrative and expository material (e.g., Dixon, 1979), the ubiquity of the observation that children find the latter more difficult than the former (Baker & Stein, 1978; Freedle & Hale, 1979; Hall, Ribovich, & Ramig, 1979; Harris & Smith, 1976; Lapp & Flood, 1978) seems sufficient warrant for addressing why that might be the case.

The present paper is primarily concerned with ambiguities that result from traditional comparative analyses of text types. To take one example, hypotheses about why children have greater difficulty with expository than with narrative prose frequently invoke some variation on a "fit to prior experience" theme (e.g., Harris & Smith, 1976). That is, narrative is

easier because children have more pre-reading and beginning reading linguistic experience with narrative forms, especially stories. Such accounts suggest many questions of clarification. For example: Do prior experiences with stories facilitate later comprehension of written narrative because children learn how narratives are typically organized (i.e., a "story schema" is available) or because children develop more efficient processing mechanisms to deal with material possessing the characteristics of the more familiar narrative form (e.g., processes for encoding and retrieving temporally organized information)? Or does form follow function, with the common superficial story structures really reflecting the fact that stories usually deal with people and their goals while expository structures must adapt to a greater variety of topics? Children's stories might then be easier not because of familiarity with the form, but rather familiarity related to their content. What aspects of relative familiarity relate to intrinsic rather than actuarial characteristics of narrative and exposition? Is it, in fact, even the case that children have more experience with narrative than expository forms? Intuitively, it seems that children hear stories less often than they hear responses to questions like "Why is the sky blue?". Similar questions could be addressed to the other hypotheses offered to account for the difficulty of exposition, e.g., ideational density and complexity (Aulls, 1978; Baker & Stein, 1978; Freedle & Hale, 1979; Hall et al., 1979); for one thing, differences in ideational difficulty must be actuarial rather than intrinsic--every story written by Kafka involves more complex ideas than <u>You and Ohio</u>--the important question

is what makes an idea difficult, and difficult in what way.

Our contention is that the ambiguity involved in interpreting differences in text difficulty has a very basic origin: the text classification scheme itself. As long as greatly diverse texts are lumped in overly subsuming categories like exposition and narrative, uniform conclusions regarding the nature of processing difficulties are not likely to be forthcoming. For one thing, it is difficult to classify texts within traditional taxonomies; there is no uniform agreement on what constitutes a narrative versus an expository text. For example, Freedle and Hale's (1979) expository passage, so classified because of its hypothetical nature (exemplified by the use of modal auxiliaries of theoretical possibility--"[to] get his stubborn horse into the barn...the farmer can go into the barn and hold out some sugar..."), would be a narrative in Brewer's (1980) classification scheme because of its underlying temporal organization. Despite the fact that many frequently occurring psychological properties of narrative and expository texts, respectively, can be identified, it can be demonstrated that any proposed psychological characteristic of exposition or narrative can be represented in varying degrees (or not at all) or be of varying importance for specific instances of both types of text. Structural familiarity is an example. Although many expository structures are less well known to children than story structures, some, e.g., lists, are relatively familiar. As Freedle and Hale (1979) and Stein (in Center for the Study of Reading, Note 1) have pointed out, there are similarities between the structures of even more conventional exposition

and narrative. For example, goals frequently have similar structural importance in exposition and narrative. Given such problems of partial overlap between the text types, is it reasonable to question whether a particular expository text would still be relatively difficult if those nonintrinsic properties typically found in exposition and associated with processing difficulty were absent and built into a narrative instead? If not, attention should not then be devoted to the properties and not to the traditionally classified text form that frequently but not necessarily possesses those properties? Since many correlated psychological properties are subsumed under the conventional text-type labels, the resultant confounding of possible causes of processing difficulty makes identification of specific difficulty loci methodologically problematic and conclusions expressed generally for a given text-type likely not to be replicated from text to text as underlying dimensions vary in uncontrolled mix.

Our primary thesis, then, can be expressed as follows. Difficulties children have with texts are attributable to specific psychological properties of the texts (and the contexts in which they are encountered). General labels of text-types only represent actuarially common (but not always present) conglomerates of text properties. Since whatever power a text-type label possesses for the prediction of text processing difficulty inheres in the specific and confounded dimensions the label imperfectly substitutes for, our recommendation is a simple one: Abandon the overly general and sometimes misleading conventional text-classification schemes as they are currently applied and, instead, characterize a text according to

its psychologically relevant properties. The next section will propose, in preliminary fashion, a general outline that might guide the development of such a text classification scheme. Only when the many dimensions of intrinsic or actuarial difference between (conventionally labeled) narrative and exposition are deconfounded will specific and psychologically valid answers to the question of the difficulty of exposition be forthcoming. And only then will instruction differentially directed as a function of type of reading material be more than a well-intentioned shot in the dark.

A Preliminary Sketch of a Multi-Dimensional Text and Context Classification Scheme

The following is an outline of some of the psychological dimensions on which texts (and readers) may differ. The discussion is organized to inform an understanding of the phenomenon that was our point of departure: The difficulty children frequently manifest in making the transition from children's stories to content area texts.

Before proceeding, some caveats. Our list of dimensions is not orthogonal nor is it intended to be exhaustive. It is not even clearly delineated--within each general dimension many sub-dimensions are scattered and precise measurement along some of the dimensions is beyond current capabilities--so that the ultimate goal of uniquely identifying a point in the multi-dimensional space that corresponds to a given text for a given reader in a given situation must remain for the present a futuristic vision. We are not offering a "how to" manual. Rather, our intention is to illustrate the complexity of the text classification problem and to suggest

directions more complete schemes may follow. It is hoped that further developments of the multi-dimensional space will permit the kind of clarity found, for example, in the multi-dimensional space for differentiating oral and written discourse developed by Rubin (1980). Finally, it is recognized that multidimensional classification will frequently vary within a given text. Ideally, the scheme would be applied to text segments that are uniformly describable by the same values on the various dimensions, where the size of such segments may vary from parts of sentences to entire passages. In fact, the frequency and extensiveness of changes in the multidimensional space within a single text may also relate to processing difficulty.

Underlying Structure

Texts vary in terms of underlying organizational structure. A text can be comprised of a sequence of events in time or it can be organized in some other, nontemporal manner. In the case of a sequential underlying structure, the presentation of events often matches the representation of events, such as in a typical, well-formed story. This is especially true in children's stories, which rarely have flashbacks. In contrast, in a nontemporally structured text, as is often found in content area material, the sequential presentation of ideas necessitated by linguistic expression does not correspond to the mental representation of those ideas. This may produce an advantage for children's stories, given that temporal congruity between presentation and representation of events facilitates comprehension of a story (Baker, 1978; Mandler, 1978; Stein & Nezworski, 1978; Thorndyke,

1977). Mnemonic advantages of temporal sequence are further indicated by the commonly observed phenomenon of imposing temporal order in the recall of nontemporally ordered text (Gomulicki, 1956).

A mismatch between presentation and representation of ideas could present processing difficulties for children in a number of ways. It may be more difficult to discern the structural organization of content area text if the underlying representation of ideas does not correspond to their order in the surface structure of the text. Also, comprehension of content area text may be impaired if substantial amounts of processing capacity are required for the restructuring of nontemporally organized text from its sequential order of input to its underlying organization, leaving less capacity for other comprehension processes, such as following a recursive pattern of superordinate and subordinate ideas in content area text. Finally, the demands for integration may be different. The necessity of text being presented as a linear sequence of segments has the virtue, already mentioned, of correspondence with the chaining together of episodes in stories. The underlying ideas in some content area texts, on the other hand, may be more holistic in nature. In such cases, the sequential and segmented nature of language may inhibit synthetic processes.

To the extent that the underlying organization of children's stories is hierarchical as well as sequential, characteristics of superordinateness tend to differ in the two text-types. It may be that goals, so frequently superordinate in children's stories, are more salient and thus more readily apprehended (thus facilitating apprehension of the entire structure) than,

for example, the subsuming abstract ideas commonly superordinate in content area text. (This is an obvious example of the promised nonorthogonality of the dimensions with, in this case, structural and content variables interacting. Actually, we consider superordinateness to be more of a semantic variable than an organizational one.)

A mismatch between presentation and representation of ideas in content area text may conflict with test demands. For example, if children are asked to recall a hierarchically organized segment of content area text, they might have difficulty retransforming this information back into a sequence of ideas (a kind of output interference). A recall of a story, in contrast, would probably be easier to produce simply because the surface organization of the story would more closely match the underlying representation of the story in memory. Here characteristics of underlying organization may interact with type of test (see the section below on Subsequent Use of Text Information), with the mismatch just described having more serious consequences for the complete reproduction of a text than for probe-type questions.

Relevance of Preexisting Structural Knowledge

Recently, a great deal of theoretical and empirical work has focused on the use of story schemata by children and adults (Mandler & Johnson, 1977; Rumelhart, 1977; Stein & Glenn, 1979; Thorndyke, 1977). Basically, this work suggests that children and adults possess information about how stories are typically organized which, independent of content or input sequence, is used to facilitate comprehension and recall of children's stories and inform

decisions on what constitutes a well-formed story. In contrast with the story schema research, much less empirical work has focused on schemata for content area discourse. However, Meyer (1975) has identified a number of content area patterns, such as problem-solution or cause-effect (naturally, this topic has received considerable attention in such disciplines as rhetoric; see Brewer, 1980).

Children may have difficulty with content area material because they do not possess structural schemata for content area text which are as well formed as those they possess for stories. They may have trouble selecting the appropriate content area schemata for a particular text from their available pool of content area schemata, given that content area forms are not as limited as children's story forms. Also, content area text may more often require the concurrent use of more than one structural schema, a further potential source of difficulty.

Digressing briefly, we believe that the importance of structural schemata has been exaggerated. As we indicated earlier, it seems likely that the common structural forms associated with children's stories result from the common content of children's stories: people, their goals, and their actions to attain goals. Expository material has a greater variety of structures because it tends to be about a greater variety of things, with different structures best fitting each thing (this is not to say that stories are only about people and their goals, but that common central concerns are much more likely to be found in stories than subject-area texts). Thus, results apparently attributable to structural story schemata

may really be due to availability of a common core of content schemata, whereas requisite content knowledge for content area text may more often be unavailable.

Form of Linguistic Expression

Relevant language characteristics include traditional readability measures as well as several other less frequently considered variables. Readability formulas have traditionally been used to determine the relative difficulty of texts (e.g. Flesch, 1949). In general, these formulas are based on some measure of vocabulary difficulty, such as word length, and some measure of sentence difficulty, such as sentence length and syntactic complexity. While these measures produce a global indication of the difficulty of a text, the inadequacies of this simplistic approach to readability have been stressed (e.g., Kintsch & Vipond, Note 2). Factors omitted include most of the potential dimensions of difficulty discussed in the present paper. Nevertheless, it has been pointed out, based on readability formulas, that children's content textbooks in school are often written at a more difficult level than their basal reader stories (Hall et al., 1979). Children may have more difficulty with content area selections than stories, in part, because of more difficult vocabulary and longer sentences in the former type of text. Content area texts may contain more complex syntax (e.g., greater relative use of passive than active voice, more embedding, etc.) and less familiar cohesion producing connectives (e.g., in other words, this shows that, for example, as well as less transparent anaphoric reference). However, it should be kept in mind that

more complex forms may sometimes promote comprehension (see Pearson, 1974-75, for example).

In addition to vocabulary difficulty and sentence complexity, texts may vary in their use of figurative language. This variation may involve not only the frequency of occurrence of figurative language, but also its communicative function (Ortony, 1975). For example, metaphors could be used merely to repeat or embellish information conveyed elsewhere literally, or they could carry exclusive communicative responsibility. Furthermore, metaphor and analogy often play a pivotal role in the elucidation of central concepts in content area texts (especially in the sciences). In children's stories, metaphor seems to more often serve peripheral functions, such as ancillary description. To the extent that figurative language is more difficult than literal language, and that content area texts contain more pivotal and unsupported use of figurative language, such texts may accordingly increase in difficulty.

Finally, oral and written language differ in many respects (Rubin, 1980; Schallert, Kleiman, & Rubin, 1977). To the extent that a written text utilizes oral language conventions congruously, the text may be easier. Consider the frequent incidence of dialogue in children's stories (but note the novel punctuation that must be introduced, perhaps adding compensating difficulty).

Content and Semantic Organization

Texts can differ along many interrelated content dimensions. Texts may be relatively abstract or concrete and imageable, with abstract text more difficult (Thorndyke, 1977). They may differ in their density of ideas versus events. If events are described, they may be real or hypothetical, contain substantial action content or be relatively peaceful, resolve rapidly or linger in unresolved suspense. Variability along these lines may affect children's processing; for example, children tend to assign great importance to action (Brown & Smiley, 1977). The number of ideas (or concept load) in texts of the same length may vary; some texts may frequently repeat (explicitly or implicitly) the same propositions while others frequently introduce new propositions, perhaps increasing text difficulty (Kintsch, Kozminsky, Streby, McKoon, & Keenan, 1975; for a detailed model that may permit measurement of a text's psychological processing difficulty along these lines, see Kintsch & van Dijk, 1978). The concepts discussed in a text may themselves vary in complexity. To take a simple example, the concept of "selling" is psychologically more complex than the concept of "giving," because the former entails the additional component of money transfer (Gentner, 1975).

Texts differ in the type and complexity of semantic relationships between ideas they contain. In stories, actions have to be pragmatically interpreted as to their relationship to goals of the characters (Bruce, 1980). More logical sorts of interrelating operations are frequently required in content area text (e.g., relating concepts to their attributes,

categorization, and so on--see also the parallel distinction between common-sense and logical modes of analysis in the section on Text Evaluation). Once again, however, such characteristics are not universally associated with a given type of text. It has been pointed out that some content area text is characterized by goal structures similar to those of stories (Freedle & Hale, 1979; Stein, 1978). It might be added that stories do not always have goal structures (stories about the random and purposeless activities of people can be very good stories--some existentialist philosophers might even say the only kind of stories that would really capture the nature of modern experience). This once again illustrates the misleading nature of the general text labels "exposition" and "narrative," as a common characteristic of one type may sometimes be absent from that type and present in the other.

Inferencing is another aspect of processing for which logical versus pragmatic semantic operations may be differentially required across texts. The information implicit in text but necessary for coherent understanding may need to be generated by pragmatic inferences (Brewer, in press) relatively more in children's stories and by logical inferences more in content area text; children may have greater difficulty making logical than pragmatic inferences (Hildyard, 1979). Likewise, relationships affecting the importance of ideas in text may more often be determined on pragmatic grounds in stories and have a logical basis in content area text. Since pragmatically based semantic processes make more demands than logical processes on content knowledge (see the next section), we once again have a demonstration of interrelatedness within the dimensional space.

Finally, content may be of varying interest to readers. However, because of the relation of interest to prior knowledge, this topic will be taken up in the next section.

Relevance and Availability of Preexisting Content Knowledge

Meaning is not conveyed solely by the linguistic content of text. Rather, meaning is constructed, using the text as a point of departure. The constructive process utilizes various kinds of contextual information, most prominent of which is the topic-related knowledge already possessed by the reader (see R. Anderson, 1977; Bartlett, 1932; Bransford & McCarrell, 1975; Dooling & Lachman, 1971; Spiro, 1977). One's knowledge structures (schemata, frames, scripts) are organized to enable such basic comprehension activities as inferencing, generating expectations, and imparting thematic connectedness (Collins, Brown, & Larkin, 1980; Rumelhart & Ortony, 1977; Schank & Abelson, 1977). Schemata have been shown to support memory for details (Anderson, Spiro, & Anderson, 1978), reconstruction (Bartlett, 1932; Spiro, 1977) and retrieval (Anderson & Pichert, 1978) of text information, determination of the relative importance of text information (Pichert & Anderson, 1977), and identification of information that requires less processing and explicit memorial representation as a function of its future derivability from other information (Spiro & Esposito, 1977; Spiro, Esposito, & Vondruska, 1978). Furthermore, if prior knowledge includes information about the typical or natural order of events, this may enhance the mnemonic advantages of temporally over nontemporally organized information (Baker, 1978; Schank & Abelson, 1977; see the earlier section on Underlying Structure).

To the extent that one's knowledge structures are derived from personal experience, employing them in understanding text may permit greater empathic involvement. Also, it is part of conventional wisdom that there are advantages to learning things directly from experience rather than indirectly from instruction (but see Ausubel, 1968, p. 467). Perhaps the ability to personally simulate what one is reading about (and thereby "live" it in a sense) might be enhanced.

Prior knowledge may affect one's expectations concerning the interestingness of classes of text materials, such as stories versus subject-area texts, although it is not clear whether interest affects performance because of motivational factors or because one tends to be more interested in things one knows about (i.e., the knowledge, not the interest, produces the effect; see Asher, 1980).

The extent to which the various advantages of conceptually driven processes will apply is a function of characteristics of texts and of readers' knowledge. In virtually all texts some information is omitted by the author on the assumption that it is available to the reader and may easily be supplied (Clark & Haviland, 1977; Grice, 1975). Texts will vary in the extent to which this is the case, some texts being relatively more self-contained than others. For texts that are less self-contained, there will be differences in the burden placed on the individual to construct new knowledge structures rather than merely instantiating existing generic knowledge structures; that is, some structures may be permanently represented in memory as "pre-compiled" wholes while others need to be

assembled when and as needed (Schank, 1979; Spiro, 1980). Additionally, texts will vary in their facilitation of conceptually driven processes, some providing clear explicit cues as to which preexisting knowledge is relevant, for how long it should be maintained as an adjunct to understanding the text, and when it should yield to other knowledge.

Further constraints on prior-knowledge-based processes result from reader characteristics. Most obviously, schemata presupposed by an author must be possessed by the reader. However, schema availability by itself is insufficient. Among other necessary accompanying processes (see Spiro, 1979), schemata must be efficiently accessed, at an appropriate level of specificity, and accurately applied to the text. Finally, different individuals' schemata for the same concept may vary in their suitedness for achieving the advantages of knowledge-based processing. For example, mere familiarity with a situation will not enable increased recall of details unless the schema for the situation is sufficiently differentiated and constrained (Anderson, et al., 1978). That is, feelings of familiarity may be generated by knowledge structures of varying states of development.

Discourse Function

Numerous taxonomies of the purpose or "force" of discourse have been proposed. For example, Brewer (1980) suggests that a text may be written to entertain, persuade, inform, or aesthetically please. Whatever the specific taxonomy, functions or purposes of reading may differ in their ease of satisfaction. In general, children may be more eager to read stories written for entertainment than content text-books written to inform.

Furthermore, it is clear that texts may be written, assigned during instruction, and read for a variety of purposes; the outcomes of comprehension may then differ accordingly. Common sense would suggest that when these purposes are not in agreement for the author, teacher, and student, adequacy of perceived comprehension outcomes can be seriously influenced.

Subsequent Use of Text Information

Related to the functions of a text are the uses to which it will later be put. Will understanding have to be demonstrated at a later time? Will such demonstrations be informal or formal? For how long will information have to be held in memory prior to the demonstration? It may be the case that story understanding in schools tends to be assessed informally (e.g., in class discussions) fairly soon after reading, while understanding of content area material is more often assessed formally, by written tests and after relatively longer delays (Dixon, 1979). In the simplest case, content area material may appear to cause difficulty just because more is expected for demonstrating its understanding. Furthermore, the standards by which a text is to be evaluated may tend to differ for stories and subject-area texts; judgments of conformity to common-sense experience may more often be applied to the former ("Could this really happen?"; "What would you do in this situation?"; etc.), whereas the latter are subject to a "literate bias" according to which they stand or fall as a function of the adequacy and internal consistency of their logical arguments (Olson, 1977).

The child is expected to learn from content area text, to update his or her knowledge by integrating new information with topically related old information, sometimes to be able to transfer the newly acquired information (i.e., apply it in some novel context). Stories, on the other hand, are not supposed to be assimilated to other similar stories. Stories are complete; different fairy tales are supposed to be differentiated, whereas, at least below the college level, the different texts in which information about the Revolutionary War is received are not supposed to maintain their particular identity (Spiro, 1980). Of course, as with all dimensions, these are just tendencies; children may be expected to learn from the morals of stories, and, in later schooling, prose fiction will become a topic of study where knowledge-updating will become relatively more important.

It is worth noting that educational ideals and testing realities frequently conflict, perhaps indirectly contributing a measure of difficulty with content area text for some children. Optimal transfer potential may be promoted by constructing trans-situationally integrated knowledge structures, but examinations usually test just the last acquisition situation and emphasize accurate memory. For such a test, compartmentalization of knowledge is frequently the best strategy (Spiro, 1977). Some children who appear to be having trouble with content area text may be confused as to what to expect, given that their teacher teaches one way and then, for convenience purposes, tests another. Such children might actually be acquiring important knowledge, but in a way not well adapted to test demands. Other children, apparently having little difficulty with

content area text (given adequate test performance), may not, in any useful way, be learning at all.

Contextual Relevance

A child's oral language experience typically includes considerable contextual support; it frequently involves things that are going on in the child's life, quite often the immediate physical environment (Rubin, 1980). Children's early oral experience with expository types of information tend to be of this contextually (and personally) relevant kind ("What's that?"; "Please explain why what just happened to me happened that way?"). The child passes a tree and asks why leaves are green. It is probably less often the case that somebody says to the child, "Let's learn about why trees are green" when there are no trees around. Children's stories, on the other hand, almost always come "out of the blue"--one typically does not wait for situations to arise involving glass slippers, pumpkin carriages, or creative mice before reading Cinderella to a child. Rather than the context of stories, it is the activity of reading itself that tends to be situationally relevant (e.g., before going to bed is a time to read stories). It may be, then, that some children are less prepared by their oral language experience for school situations that involve contextually irrelevant, "out of the blue" written presentation of expository material. On the other hand, contextual discontinuity may seem less unnatural with stories.

Extra-Textual Support

Text is frequently supplemented in various ways to enhance understanding or interest. Depending on how they are used, adjunct questions (Anderson & Biddle, 1975), advance organizers (Mayer, 1979), and illustrations (Schallert, 1980), among other devices (see T. Anderson, 1980, for a review), may all result in some decrease in text difficulty. Since the applicability of such support devices will depend on the types of difficulty they are intended to overcome, this aspect does not constitute an independent dimension within the scheme. Rather, it requires a recursive analysis of the extra-textual aid and its relation to a specific text in terms of all the preceding dimensions.

Concluding Remarks

Obviously, the classification scheme as presented is not even close to completely formed. Surely important dimensions have been overlooked. It is clear that the dimensions (and sub-dimensions) require more precise differentiation and, in some cases, development of reliable methods of measurement. Calibrating the various measurement metrics will present further problems. However, since our goal was nothing so ambitious as the construction of a complete model, we will be satisfied if three of our modest goals were attained. First, we hoped to demonstrate the complexity of the web of psychological properties that distinguish the processing of one text from another and, thereby, the need to abandon simplistic traditional classifications of text as a basis for investigating the differential difficulty texts may present. Second, we wanted to offer

preliminary suggestions that might provide useful directions for the development of a complete and practical method of multidimensional text classification.

Third, we intended that our discussion of text classification, however embryonic, would provide a framework for the design and interpretation of empirical studies that less ambiguously identify sources of difficulty in children's transition to subject-area reading. The discussion of psychological text properties, besides aiming towards a text classification logic, is a collection of hypotheses about why that transition may be difficult for some children; that is, the scheme suggests dimensions to include in multivariate correlational studies of the transition phenomenon using existing texts and to control when constructing texts for experimental investigations. A caveat: The demands of rigorous experimental control, by extirpating properties from those with which they typically co-occur, may produce artificial texts artificially responded to--a measure of ability to adapt to ecologically invalid reading situations would likely be of little utility. Another caveat: processing difficulty along any of the dimensions can lead to comprehension failure; care should be taken to identify individuals whose apparently equivalent degrees of disability may be measuring very different sources of disability. The same caveat may even apply for the same individual across types of text; for example, a child experiencing difficulty with whatever is read may be having different problems with stories than with subject-area texts.

Identifying psychological dimensions of text processing difficulty would only be the first step. One would still want to know why some text property caused difficulty. Is it a problem of initial understanding? Of remembering? Might the transition problem result from cognitive capacity limitations on the number of dimensions of difficulty that can be dealt with in the same text? (In which case the strategy of manipulating one dimension at a time may be unrevealing.) Are certain kinds of processes inherently easier, or is it more a matter of fit to prior oral or written language experience? If the latter, does experience at some level of a text dimension produce positive transfer to stories or negative transfer to subject-area texts? Would the source of such effects be experiences in school, out of school, or both?

Finally, the outcomes of research such as we have proposed would have obvious instructional implications. For example, they could serve as a framework to guide further research aimed at developing strategies for overcoming difficulty along the various dimensions. More ambitiously, development of the multidimensional text classification scheme could permit investigation of alternative sequences of phasing in subject-area text by gradually increasing the number of dimensions with difficulty that they contain, perhaps ultimately developing procedures for identifying instructionally optimal sequences of text transitions suited to individual needs.

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